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ABSTRACT

The University of North Texas received a Preparing Tomorrow's Teachers to Use Technology (PT3) Capacity Building grant in 1999 and a three-year Implementation grant in 2000. As a part of the PT3 activities, a four-course sequence was formalized to reach the goals. The evolution of this technology integration course sequence is described. Data gathered from 117 preservice educators at the University of North Texas (UNT) during 2001-2002 is used to compare Intel's Preservice Teach to the Future curriculum to a traditional technology integration format. Major findings are that the Intel curriculum appears comparable to the traditional UNT program in advancing preservice educator Stages of Adoption of Technology and skills in electronic mail, World Wide Web, integrated applications, and teaching with technology. (Author/AEF)

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Intel Preservice Teach to the Future

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Abstract

Data gathered from 117 preservice educators at the University of North Texas during 2001-2002 is used to compare Intel's Preservice Teach to the Future curriculum to a traditional technology integration format. Major findings are that the Intel curriculum appears comparable to the traditional UNT program in advancing preservice educator Stages of Adoption of Technology and skills in electronic mail, World Wide Web, integrated applications, and teaching with technology.

Key Words: preservice, Intel, technology integration

Introduction

The University of North Texas received a Preparing Tomorrow's Teachers to Use Technology (PT3) Capacity Building grant in 1999 and a three-year Implementation grant in 2000. As a part of the PT3 activities, a four-course sequence was formalized to reach the goals. The evolution of this technology integration course sequence is described in the following section.

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UNT Technology Integration Course Sequence

Undergraduate courses at the University of North Texas are numbered in a four-digit sequence for which the first number indicates the approximate year-level of the content and the remaining three indicate the focus of the course. In keeping with this scheme, the first course in the UNT integration sequence is considered a freshman-level computer applications course (1100) that is fairly standard throughout the campus, but the educational version utilizes educationally-relevant examples. The second course is a junior-level teacher productivity course (3440) while the third is a senior-level (4100) classroom/learner technology methods course. Some of the students in the second and third course enroll in the two concurrently. Students completing the entire sequence typically enroll in the third course one or two semesters before student teaching. This three-course sequence has for more than a decade been approved for a Texas Education Agency Information Processing Technologies (IPT) endorsement which can be added to a teaching certificate. Beginning in 1997, in order to prepare future teachers for continuous K-12 technology integration as mandated by the new Texas Essential Knowledge and Skills (TEKS) curriculum, the third course was modified to include a major module on the TEKS. Starting in fall 2001, the Computers in the Classroom course (4100) became a required course for all elementary education majors. This course was also a part of the Intel Preservice Teach to the Future curriculum beginning in fall 2001.

A fourth undergraduate course in the sequence (CECS 4800), focusing on technology integration mentoring, was formulated during this time frame as well, and was offered for the first time during the spring semester of 2000. This course places

students in existing classrooms to work with teachers in technology integration activities. Students concurrently acquire knowledge of classroom management and teaching strategies while contributing technology infusion expertise.

Completion of the four-course sequence listed in Table 1 entitles undergraduates to a University of North Texas certificate in curriculum and technology integration. Although this certificate currently carries no official status other than recognition by the University of North Texas, it is consistent with the needs expressed by several Texas school districts and is closely aligned with the TEKS.

Table 1.
Content for Computer Education & Cognitive Systems (CECS) Courses in Technology Applications Sequence

CECS 1100: Computer Applications in Education This is a tool-based course in which students learn to use an integrated word processing, spreadsheet and database package.
CECS 3440: Technology and the Teacher This course includes the use of presentation software and theories as well as the instructional design of presentation materials.
CECS 4100: Computers in the Classroom Students in this class learn to find appropriate instructional software for the classroom, develop a multimedia project, find Internet resources for classroom use, develop a technology infused lesson plan, and make a web page to link to their instructional resources.
CECS 4800: Technology Integration Mentoring or equivalent from approved list This course includes the pairing of preservice students with classroom teachers to provide technology integration mentoring experiences in a real-world environment.

Intel Preservice Teach to the Future Curriculum

In 2001 UNT received an Intel Pre-service Teach to the Future grant to provide additional resources to students enrolled in the third course in the sequence, Computers in the Classroom. Intel is currently implementing the Intel Teach to the Future program in the in-service K12 education arena in over 24 countries worldwide, with a goal of reaching 500,000 teachers by the end of 2002 (Intel, 2002). Results to date indicate that

the program is a great success with more than 90 percent of in-service teacher respondents reporting that the ideas and skills they learned are helping them successfully integrate technology into classroom activities. Intel has recognized that this program could have significant value for pre-service education and has thus committed to providing resources to interested colleges and universities.

UNT Technology Integration Goals

The focus of the UNT initiative encompassing the PT3 grant and the Intel Preservice Teach to the Future grant is to prepare pre-service teachers to integrate technology into their future classrooms. Included in the Computers in the Classroom course is the opportunity for students to analyze computer uses in education including simple applications that can be integrated into the classroom environment. In addition students gain knowledge in the selection of educational software, become comfortable modeling an educational presentation system, understand the integration of technology into the classroom and the use of other electronic sources for educational classroom resources. Students develop a unit portfolio on a chosen topic that involves the integration of technology.

Research Methodology

Pre-post data was collected online from all students enrolled in the Computers in the Classroom course, including new Intel sections for 2001-2002, as well as traditional format sections offered since 1998. These data included skill measures aligned with the International Society for Technology in Education (ISTE) standards as well as attitudinal

assessments. Statistical procedures such as analysis of variance were used to determine changes in pre-post measures as well as to compare the two curricular approaches. Data from Intel from 2001-2002 was compared to previous semesters for traditional students taking this course, in order to minimize change-of-instructor effects that would confound findings if only single-semester Intel vs. non-Intel indices were compared. This approache was necessary because the three veteran instructors from the traditional course format all shifted to Intel during 2001-2002. Effect Size, which is a standardized measure of magnitude of change, was the primary comparison basis for skill and attitude changes within and across semesters.

Data Acquisition

Pretest and post test data gathered from preservice educators at the University of North Texas between fall 1998 and fall 2001 form the basis of this paper. Undergraduate students completed the following instruments:

1. Teachers' Attitudes Toward Computers (TAC) (Christensen & Knezek, 1998), which is a Likert/Semantic Differential Instrument for measuring teachers' attitudes toward computers on 9 constructs.

2. *Technology Proficiency Self-Assessment* (Ropp, 1999) measures educator proficiency in electronic mail, the World Wide Web, Integrated Applications and Teaching with Technology.

3. Stages of Adoption (Christensen, 1997) is a self-assessment instrument of a teacher's level of adoption of technology, based on earlier work by Russell (1995). There are six

possible stages in which educators rate themselves: Stage 1 – Awareness, Stage 2 – Learning the process, Stage 3 – Understanding and application of the process, Stage 4 – Familiarity and confidence, Stage 5 – Adaptation to other contexts, and Stage 6 – Creative applications to new contexts.

4. Level Of Use (Griffin & Christensen, 1999) is a self-assessment instrument adapted from the Concerns-Based Adoption Model (CBAM) Level of Use designations for adoption of an educational innovation.

An online data acquisition system was used to administer the same battery of instruments to these university students at the beginning and again at the end of their semester-long courses. Only Stages of Adoption and Technology Proficiency Self-Assessment findings are reported in this paper.

Results

As shown in Table 2 and graphically displayed in Figure 1, progress toward technology integration as measured by self-reported Stage of Adoption was fairly consistent for the UNT course Computers in the Classroom (CECS 4100) across the years 1998 – 2000 (Effect Size = .87 – 1.02). On the other hand, the Effect Size for this class in its first offering in the Intel format during the fall of 2001 was .62. First semester growing pains for instructors teaching a new course could easily account for the difference, and it is worth noting that the Intel-format improvement in Stages of Adoption was still much greater than either of the CECS 1100/3440 comparison classes (ES = .31 and .14 respectively). Data being gathered for the spring 2002 semester (as this article is going to press) may provide additional evidence regarding the consistency and source of this trend.

Table 2.
Preservice Educator Stages of Adoption of Technology, 1998-2001

	Stage Pre	Stage Post	Change	Pre SD	Effect Size	n
UNT/CECS F98 4100	4.36	5.23	0.87	1.0	0.87	22
UNT/CECS F99 4100	3.89	4.89	1.0	1.1	0.91	19
UNT/CECS F00 4100	4.20	5.30	1.1	1.08	1.02	20
UNT/CECS F01 4100	4.1	4.86	0.76	1.22	0.62	64
UNT/CECS F01 1100	3.96	4.42	0.46	1.48	0.31	36
UNT/CECS F01 3440	4.50	4.65	0.15	1.04	0.14	17

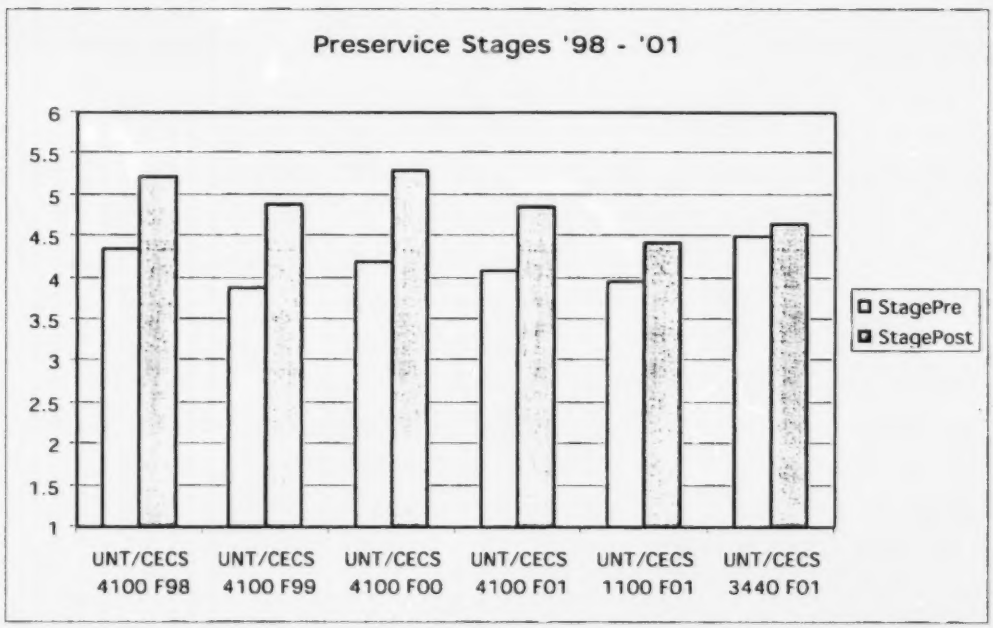

Fig. 1. Preservice teacher Stages of Adoption for UNT Preservice Classes

Contrasts in Skill Development

As shown in Tables 3-6 and graphically displayed in Figures 2-5, specific skill areas as measured by the Technology Proficiency Self Assessment questionnaire (Ropp, 1999) advanced at different rates for different preservice classes. Table 3 and Figure 2, for example, show a sizeable gain for the Intel section of Computers in the Classroom (CECS 4100) and the lower level Computer Applications class (CECS 1100). However students enrolled in Technology and the Teacher (CECS 3440) reported a decline in their perceived level of email skill.

Table 3.
Preservice Educator Email Skill, Fall 2001

	TP Email Pre	TP Email Post	Change	Pre SD	Effect Size	n
UNT/CECS F01 4100	4.07	4.45	0.38	0.80	0.48	71
UNT/CECS F01 1100	4.15	4.50	0.35	0.72	0.49	28
UNT/CECS F01 3440	4.51	4.28	-0.23	0.62	-0.37	18

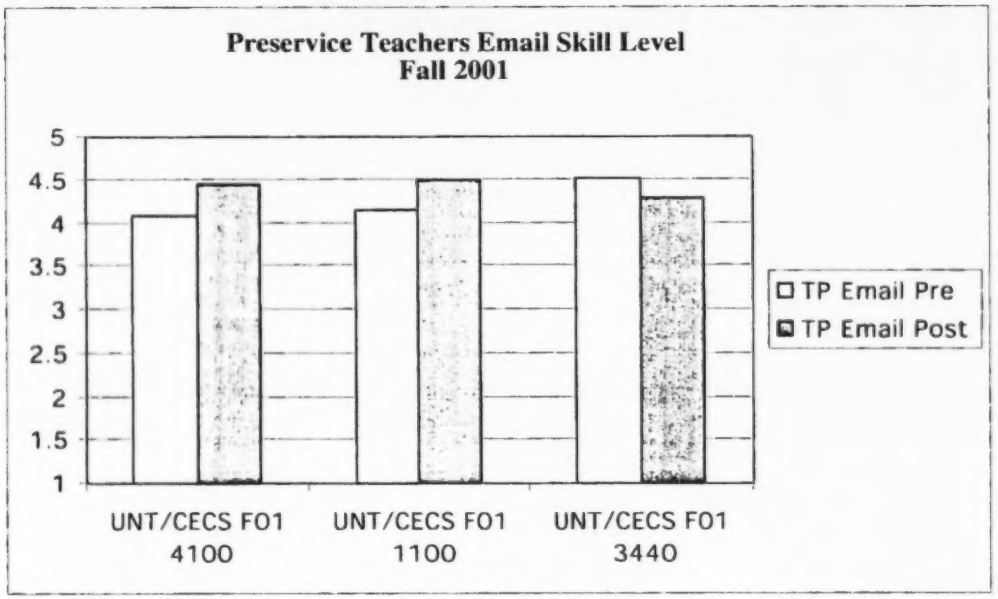

Figure 2. Pre-post changes in preservice educator skills measured by the Technology Proficiency Self Assessment Questionnaire.

As shown in Table 4 and graphically illustrated in Figure 3, for the WWW there was a similar contrast to that previously reported for email. Among the Computer Applications, Computers in the Classroom and Technology and the Teacher students, those in the first two classes reported large gains while those in the third reported declines.

Table 4.
Preservice Educator World Wide Web Skill, Fall 2001

	TPWWW Pre	TPWWW Post	Change	Pre SD	Effect Size	n
UNT/CECS F01 4100	3.94	4.56	0.62	0.72	0.86	71
UNT/CECS F01 1100	3.76	4.20	0.44	0.71	0.62	28
UNT/CECS F01 3440	4.12	3.99	-0.13	0.66	-0.20	18

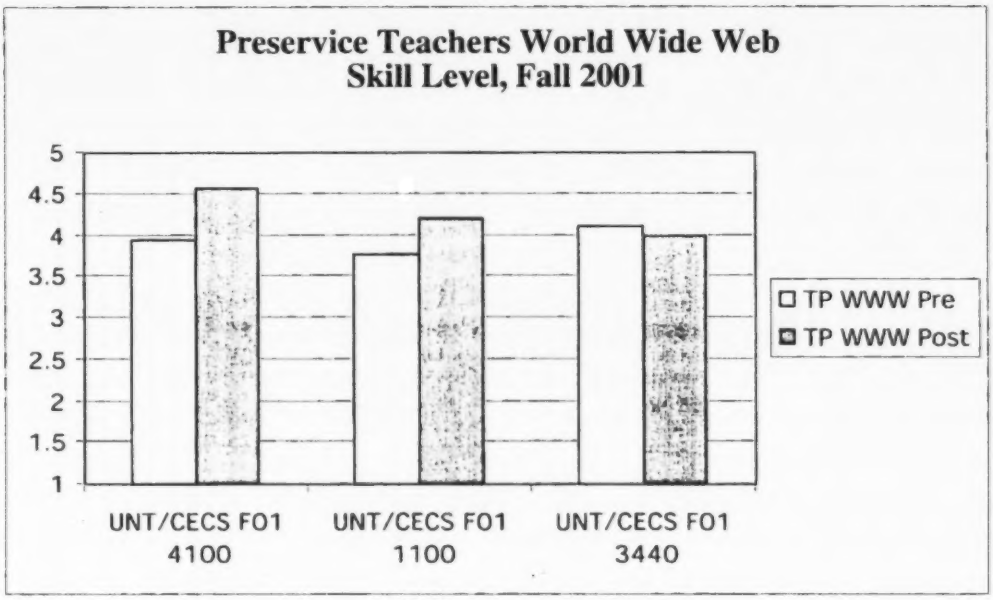

Figure 3. Pre-post changes in WWW skills for preservice educators, Fall 2001

As shown in Table 5 and graphically illustrated in Figure 4, CECS 4100 (Computers in the Classroom) exhibited large gains in the area of Integrated Applications while Computer Applications Tools (CECS 1100) students showed a moderate gain. The slope for CECS 3440 at UNT was practically flat from pretest to posttest in this area.

Table 5.
Preservice Educator Integrated Applications Skills, Fall 2001

	TPIA Pre	TPIA Post	Change	Pre SD	Effect Size	n
UNT/CECS F01 4100	3.38	4.43	1.05	1.02	1.03	71
UNT/CECS F01 1100	3.46	4.16	0.70	1.07	0.65	28
UNT/CECS F01 3440	3.93	3.79	-0.14	0.72	-0.19	18

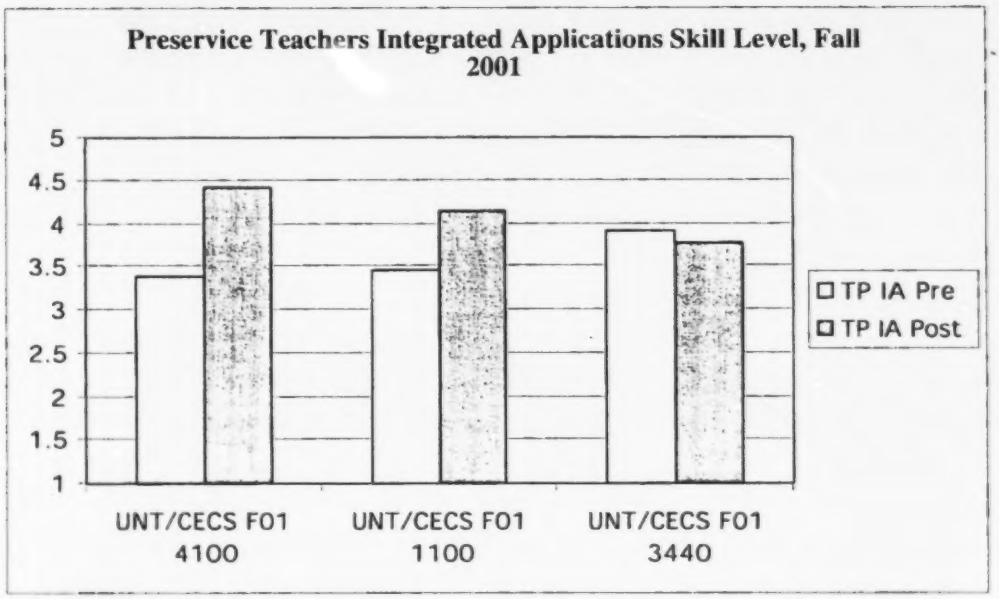

Figure 4. Pre-post changes in preservice educator integrated applications skills, Fall 2001.

As shown in Table 6 and graphically illustrated in Figure 5, the Intel sections of the CECS 4100 course at UNT, which focus on classroom technology integration techniques, showed an especially large gain (ES = 1.41) in the area of Teaching with Technology on the TPSA. Computer Applications students reported small gain in this area (ES = .41) while Technology and the Teacher students reported practically no gain in this area.

Table 6.
Preservice Educator Teaching with Technology Mean Scores, Fall 2001

	TPTT Pre	TPTT Post	Change	Pre SD	Effect Size	n
UNT/CECS F01 4100	3.39	4.46	1.07	0.76	1.41	64
UNT/CECS F01 1100	3.67	3.96	0.41	0.92	0.45	37
UNT/CECS F01 3440	3.92	3.96	0.04	0.78	0.05	18

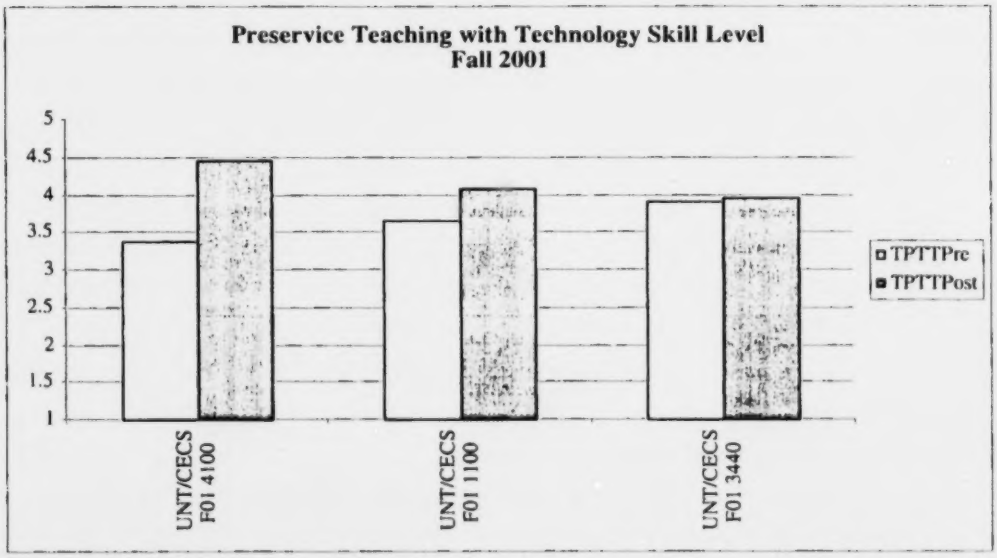

Figure 5. Pre-post teaching with technology skill levels for preservice educators, Fall 2001

Discussion

Effect Size indices (ES = Mean2-Mean1/Standard Deviation1), which are standardized measures of magnitude of change, are convenient bases for comparisons across courses and other training techniques.

> According to Kulik and Kulik, an Effect Size of 0.30 constitutes a 'moderate but significant effect'; Ryan notes that an Effect Size of 0.30 is equivalent to approximately three months' gain in student achievement. Thus, an Effect Size of 0.30 or better in favor of technology-based instruction suggests that such instruction is significantly effective... (Bialo & Sivin-Kachala, 1996, p. 2)

By this standard, the preservice courses identified in this paper range from superior to marginal in their ability to foster classroom technology integration techniques.

Table 7 places technology integration training within the broader context of preservice/inservice education by sorting several classes and training sessions according to effect size. As illustrated by the Effect Size of Fall 2002 CECS 4100 vs. the south Dallas inservice teachers, well-organized technology integration education delivered in the teachers' school building over the course of a school year can result in gains comparable to the Intel-structured preservice class. However, the traditional format of the preservice course resulted in greater gains than either the Intel curriculum or the inservice activities.

Table 7.
Preservice vs. Inservice Stages of Adoption Changes During Technology Integration Training Sessions (Pre-Post)

	Stage Pre	Stage Post	Effect Size	Change	SD	n
UNT/CECS F00 4100 Traditional	4.20	5.30	1.10	1.08	1.02	20
UNT/CECS F99 4100 Traditional	3.89	4.89	1.00	1.10	0.91	19
UNT/CECS F98 4100 Traditional	4.36	5.23	0.87	1.00	0.87	22
UNT/CECS Fall01 4100 (1-3) Pre-service Intel	4.10	4.86	0.62	0.76	1.22	64
South Dallas district Fall 1999 Inservice	3.90	4.67	0.58	0.77	1.33	96
North Dallas district 1999-2000 Inservice	4.44	4.86	0.34	0.42	1.22	428
UNT/CECS Fall01 1100 Preservice	3.96	4.42	0.31	0.46	1.48	36
UNT/CECS Fall01 3440 Preservice	4.50	4.65	0.14	0.15	1.04	17

An analysis of individual item responses was done to compare the TPSA items to the International Society for Technology in Education (ISTE) standards for preservice

teachers. Item # 14 from the TPSA – I feel confident I could use the computer to create a slideshow presentation – addresses the ISTE standard 19: use technology productivity tools to complete required professional tasks. As shown in Table 8, pre-post effect size was large for item # 14 (> 2/3 standard deviation). Item # 17 from the TPSA – I feel confident I could create a lesson or unit that incorporates subject matter software as an integral part – addresses the ISTE standards: 6) identify specific technology applications and resources that maximize student learning, address learner needs, and affirm diversity; 7) design and teach technology-enriched learning activities that connect content standards with student technology standards and meet the diverse needs of students; 8) design and peer teach a lesson that meets content area standards and reflects the current best practices in teaching and learning with technology; and 9) plan and teach student-centered learning activities and lessons in which students apply technology tools and resources. As shown in Table 8, the pre-post changes for item # 17 also reflected a large change.

Table 8.
Preservice Technology Proficiency Item Analysis for TPSA Items # 14 and #17

Course	Pre Means Item # 14	Post Means Item #14	Item # 14 Effect Size	Pre Means Item # 17	Post Means Item #17	Item # 17 Effect Size
CECS 4100	3.62	4.77	.91	3.15	4.52	1.37

Summary/Conclusions

The pilot study reported in this paper indicates that courses utilizing the Intel Preservice Teach to the Future curriculum as well as courses based on other well-formulated curricula can be effective in fostering gains in technology integration skills. Additional pre-post data gathered in subsequent semesters may provide a richer understanding of strengths and weaknesses of each curriculum approach.

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